Empirical Data Packet No. 2 for Econ 502: Financial Crises and the US “Great Recession”

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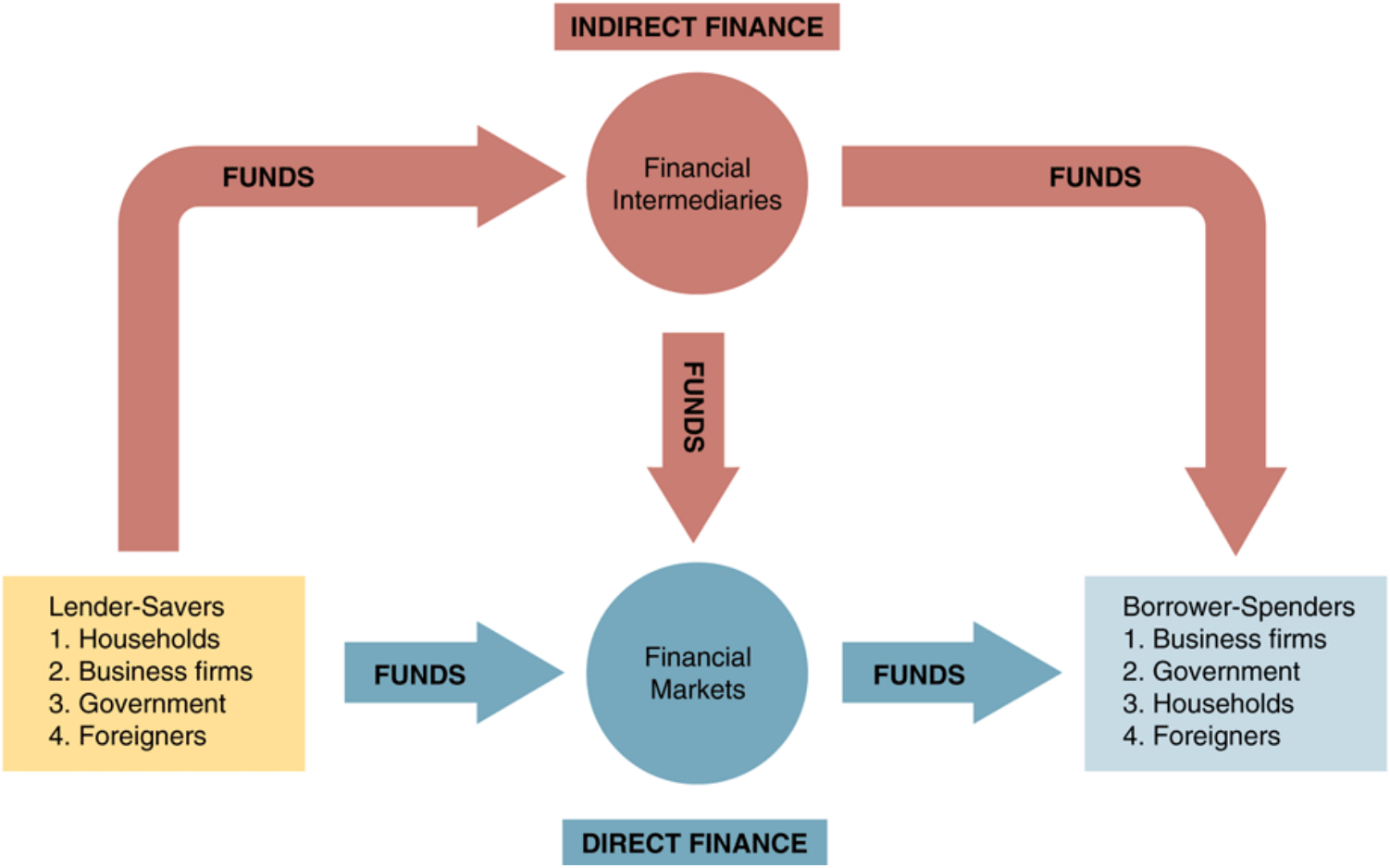
"*In the long run* we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again"

J. M. Keynes *Tract on Monetary Reform* 1924

Flows of Funds Through U.S. Financial System

Loans by Banks and Other Financial Intermediaries



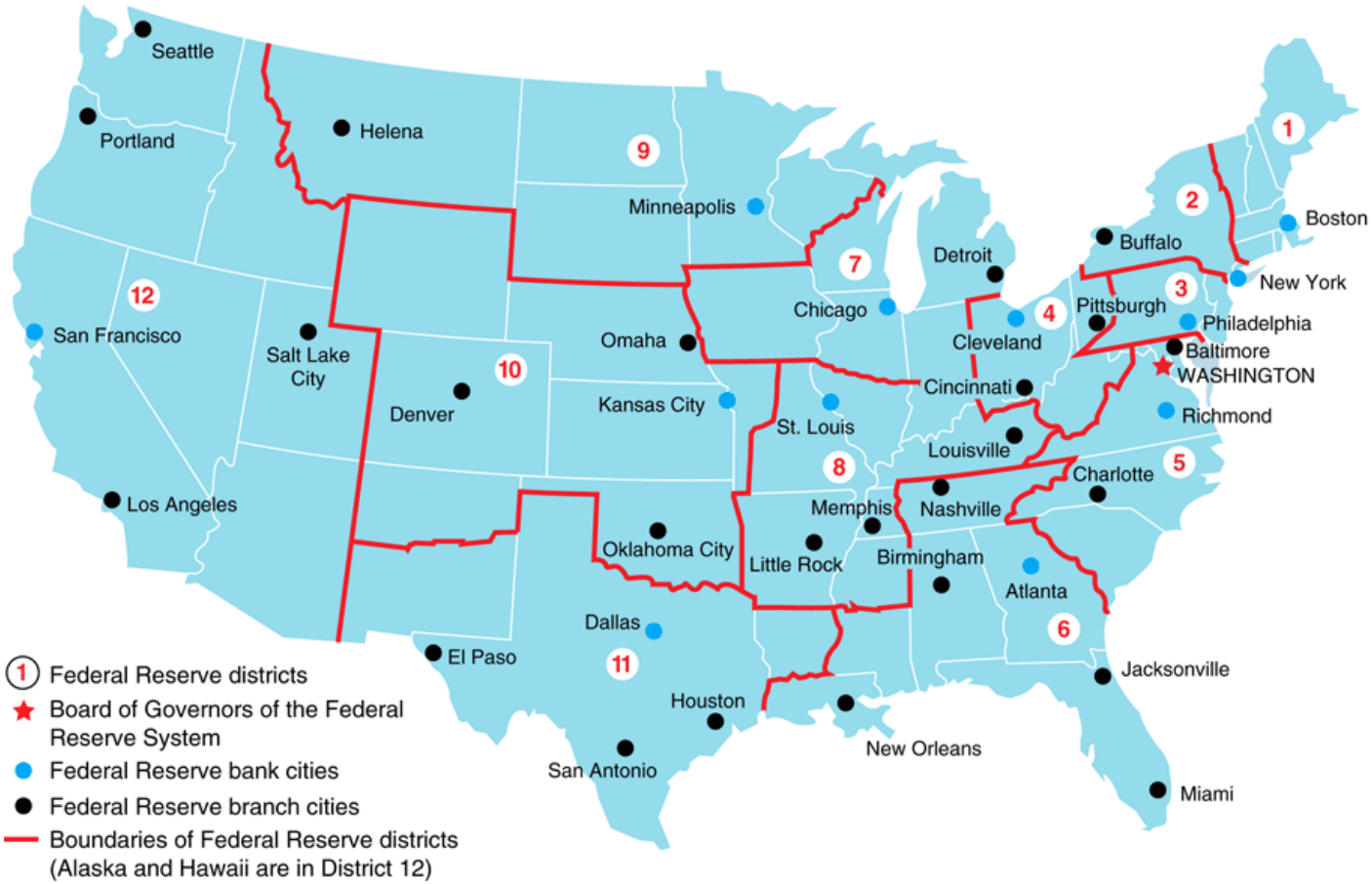
Lender/saver purchases of initial public offerings (IPOs) of stocks, bonds, and other securities in "primary" (initial sale) security markets

Principal Regulatory Agencies of the U.S. Financial System

Founded:			
1933	Securities and Exchange Commission (SEC)	Organized exchanges and financial markets	Requires disclosure of information, restricts insider trading
1974	Commodities Futures Trading Commission (CFTC)	Futures market exchanges	Regulates procedures for trading in futures markets
1863	Office of the Comptroller of the Currency	Federally chartered commercial banks	Charters and examines the books of federally chartered commercial banks and imposes restrictions on assets they can hold
1934	National Credit Union Administration (NCUA)	Federally chartered credit unions	Charters and examines the books of federally chartered credit unions and imposes restrictions on assets they can hold
1780s	State banking and insurance commissions	State-chartered depository institutions	Charter and examine the books of state-chartered banks and insurance companies, impose restrictions on assets they can hold, and impose restrictions on branching
1933	Federal Deposit Insurance Corporation (FDIC)	Commercial banks, mutual savings banks, savings and loan associations	Provides insurance of up to $100,000 (temporarily $250,000) for each depositor at a bank, examines the books of insured banks, and imposes restrictions on assets they can hold
	Federal Reserve System	All depository institutions	Examines the books of commercial banks that are members of the system, sets reserve requirements for all banks
1989	Office of Thrift Supervision	Savings and loan associations	Examines the books of savings and loan associations, imposes restrictions on assets they can hold

US central bank founded in 1913

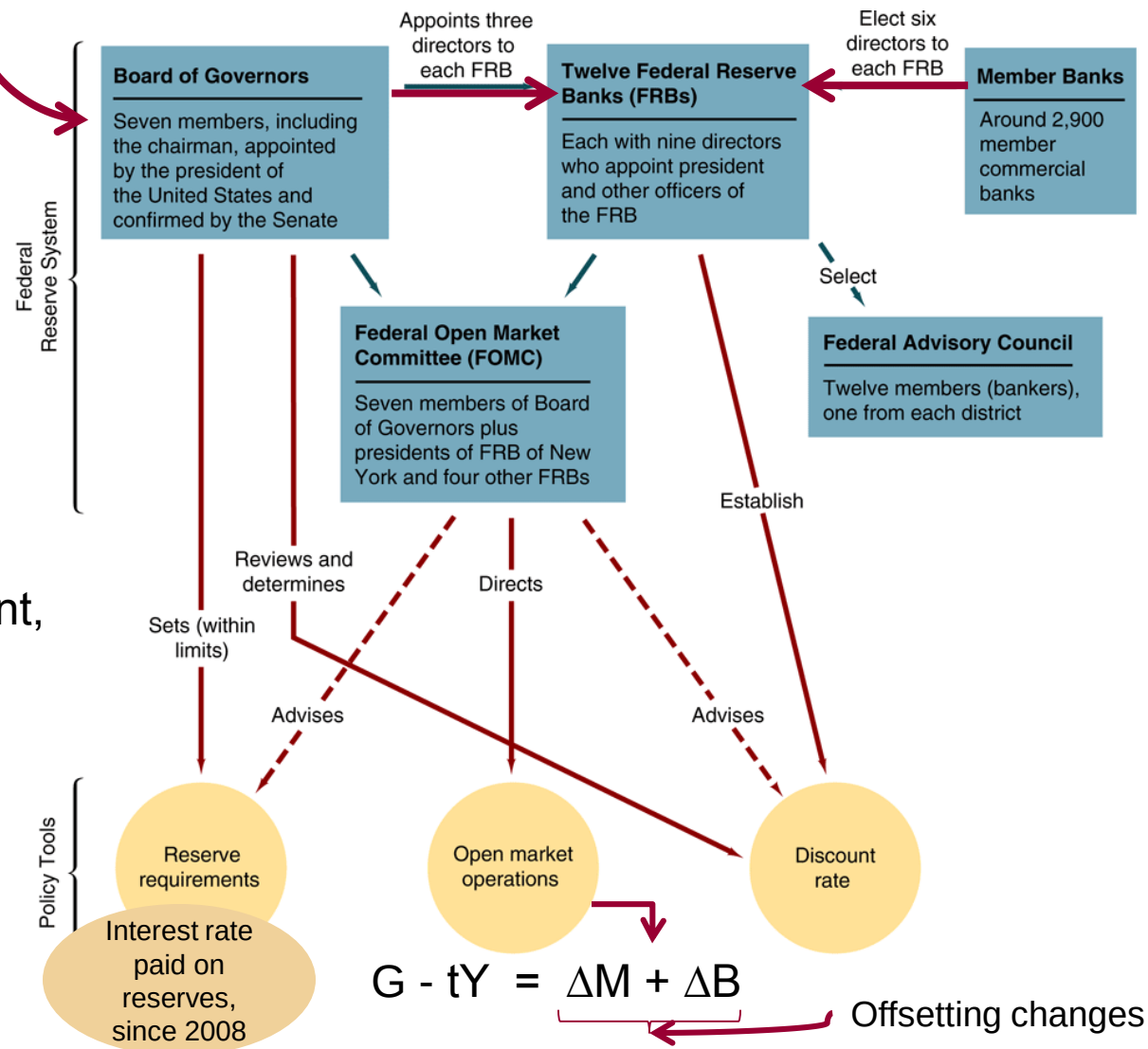
The U.S. Federal Reserve System



Source: Federal Reserve *Bulletin*.

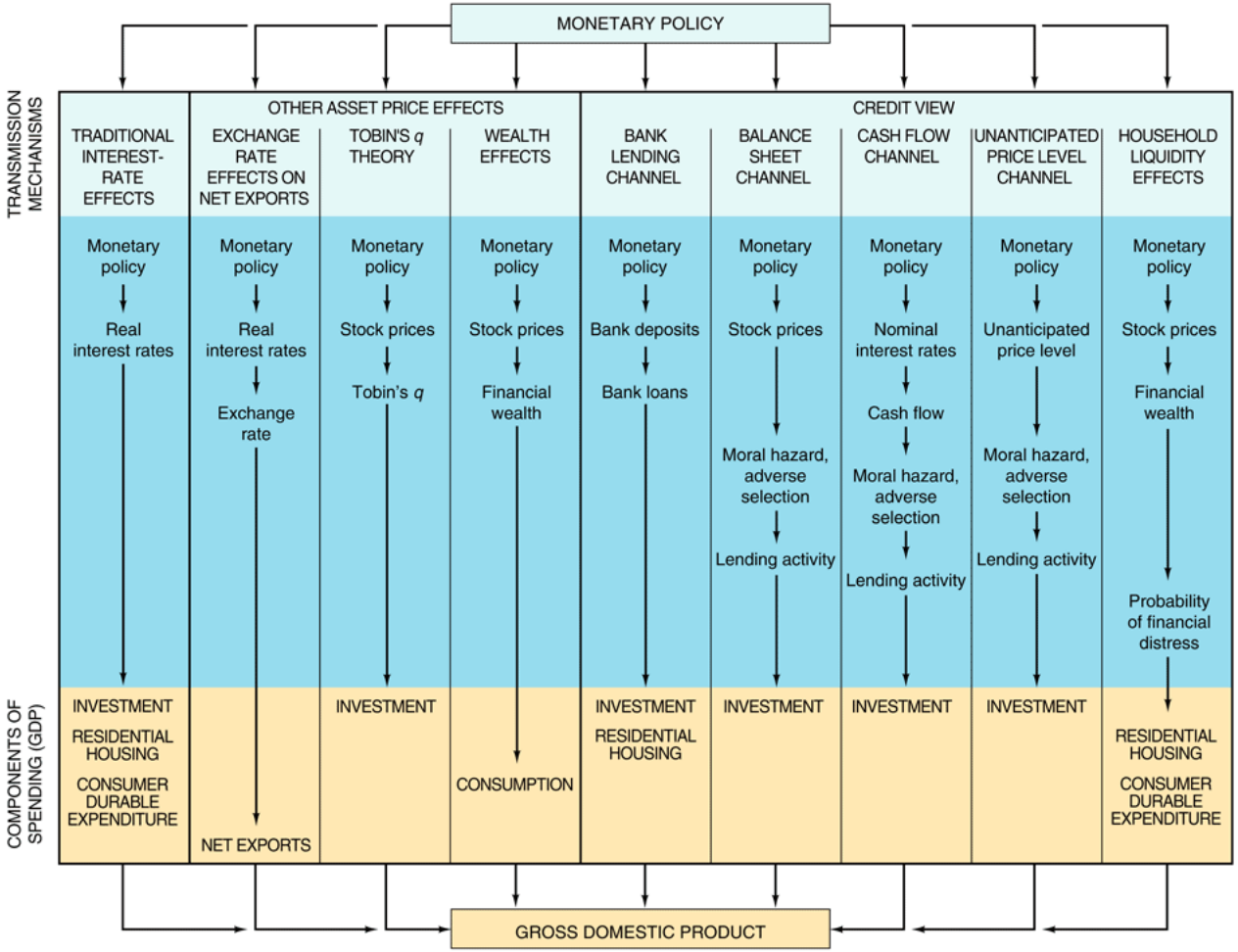
Federal Reserve: Organizational Structure and Traditional Types of Policy Tools

Chairman:
4-Year Term
Six Others:
14-Year Terms



Fed Reserve Goals:
"…maximum employment, stable prices, and moderate long-term interest rates."

Links Between Monetary Policy and GDP: Complicated Monetary Transmission Mechanisms



Linkages Between Central Bank Tools, Policy Instruments, Intermediate Targets, and Policy Goals

Tools of the Central Bank	Policy Instruments	Intermediate Targets	Goals
Open Market Operations Discount Policy Reserve Requirements	Reserve Aggregates (reserves, nonborrowed reserves, monetary base, nonborrowed base) Interest rates (short-term such as federal funds rates)	Monetary Aggregates (M1, M2) Interest rates (short-term and long-term) Inflation rate	Price Stability High Employment Economic Growth Financial Market Stability Interest-Rate Stability Foreign Exchange Market Stability

Interest Rate Paid on Reserves (2008), Quantitative Easing, Loans to Non-Banks, Credit Easing (Altering Composition of Fed's Balance Sheet), Macroprudential Regulation of Credit Markets …

New tools used for global financial crisis after fed funds rate lowered to zero in December 2008

NOTES:

1) The ***discount rate*** is the interest rate charged to commercial banks and other depository institutions on loans they receive from their regional Federal Reserve Bank's lending facility--the discount window.

2) ***Open-Market Operations =*** Central bank buys and sells (short term) gov't bonds from/to the private sector in an attempt to keep interest rates at specified target levels.

3) ***Quantitative Easing (QE)*** is when a central bank buys financial assets (mortgage-backed securities, long-term Treasury bonds,…) from the private sector in order to inject a pre-determined amount of money into the economy.

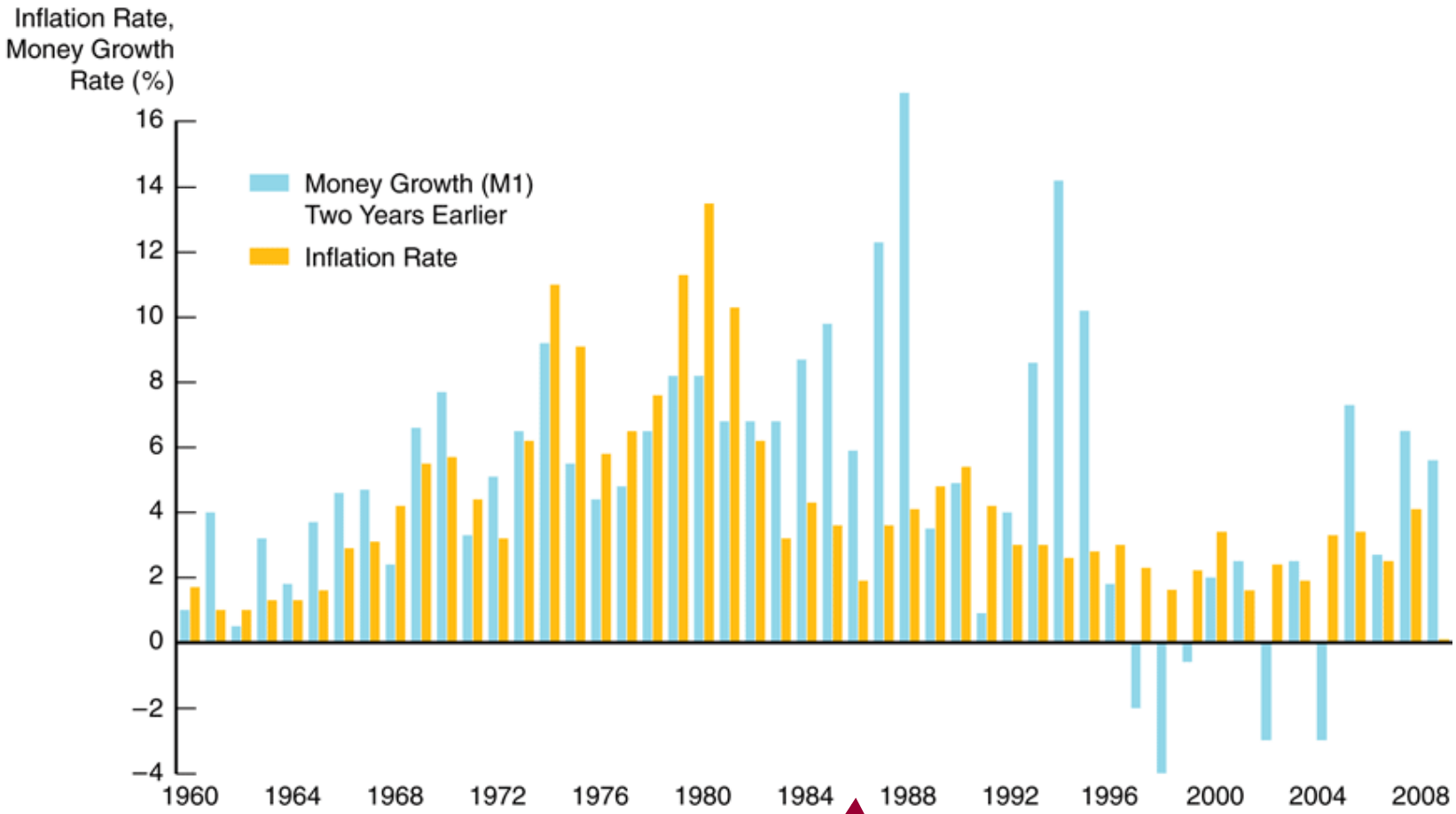
SUMMARY **TABLE 1** **Advantages and Disadvantages of Different Monetary Policy Strategies**

	Monetary Targeting 1979-1982 in US	Inflation Targeting "Taylor Rule" 1990-2007	Discretionary Policy (Implicit nominal anchoring on inflation control via setting of fed funds rate targets etc.,…)
Advantages	Immediate signal on achievement of target	Simplicity and clarity of target	Does not rely on stable money–inflation relationship
		Does not rely on stable money–inflation relationship	"Demonstrated success in United States" (1987– 2006 under Greenspan, common opinion until financial crisis hit in 2007)
		Increased accountability of central bank	
		Reduced effects of inflationary shocks	
Disadvantages	Relies on stable money–inflation relationship	Delayed signal about achievement of target	Lack of transparency
		Could impose rigid rule (though has not in practice)	Success depends on individuals in charge
		Larger output fluctuations if sole focus on inflation (though not in practice)	Low accountability

Bernanke (2006->2014)
Janet Yellen (2014-present) ?

Adopted by central banks in New Zealand, Canada, UK, Sweden, Finland, Australia, Spain…

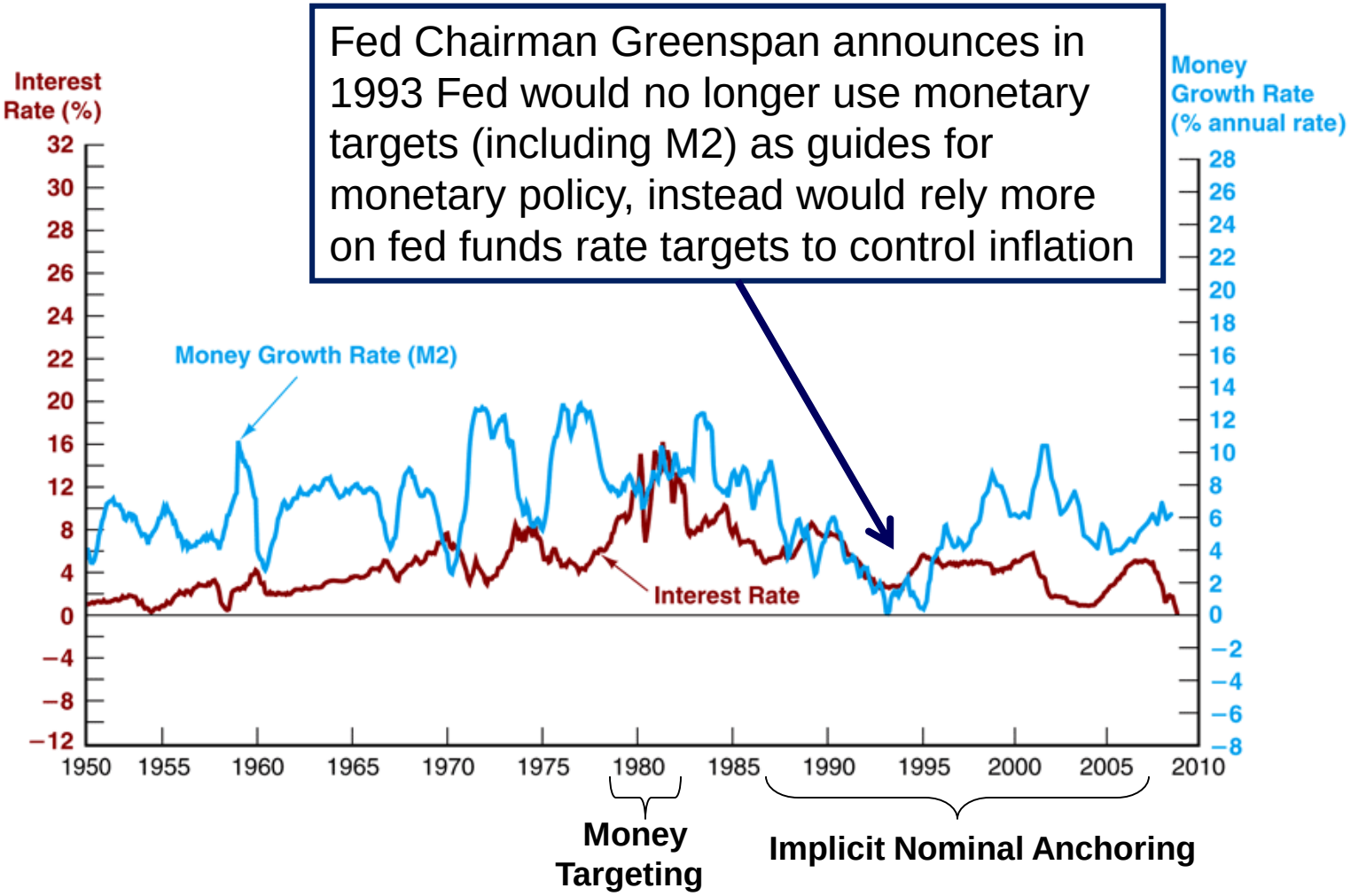
Inflation and M1 Money Growth, 1960–2008



Fed switched from M1 to M2 money supply measure in 1987

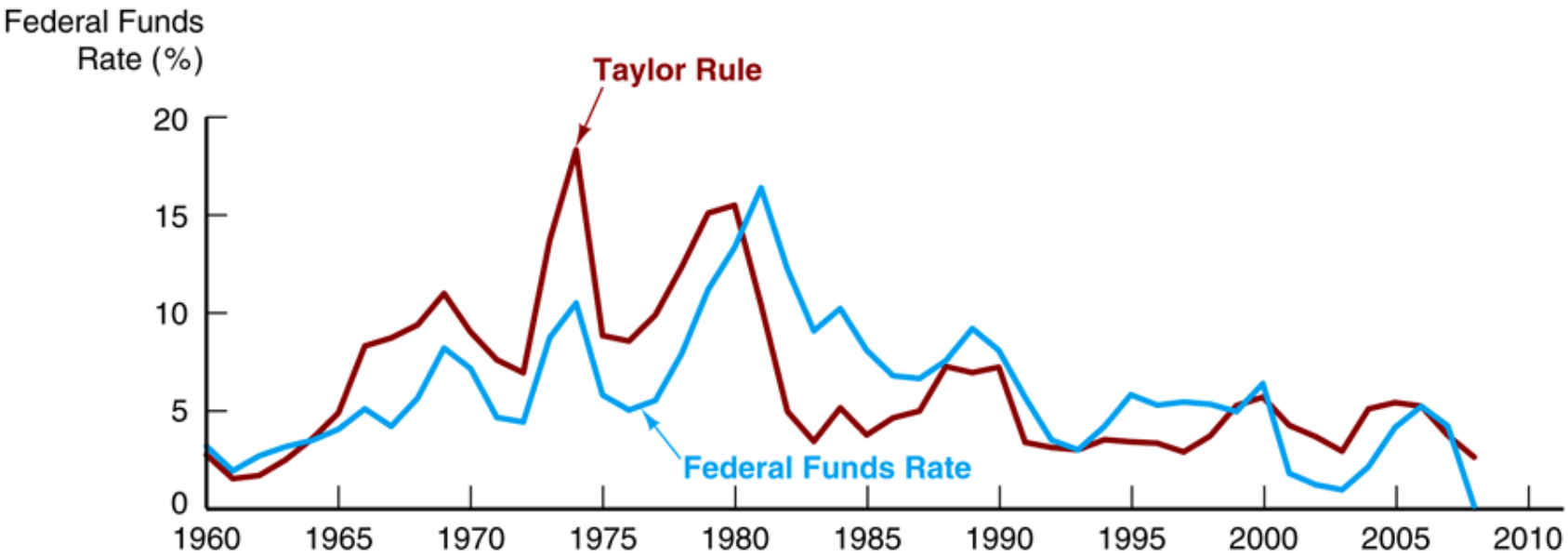
Source: Economic Report of the President; www.federalreserve.gov/releases/h6/hist/h6hist1.txt.

Money Growth (M2, Annual Rate) and Interest Rates (Three-Month Treasury Bills), 1950–2010



Source: Federal Reserve: www.federalreserve.gov/releases/h6/hist/h6hist1.txt.

Did Greenspan in effect use a "Taylor Rule" monetary policy for setting fed funds rate?



Taylor Rule (Simple Form) for the setting of the fed funds rate i :

$$[i - i^*] = a[\pi - \pi^*] + b[Y - Y^*]/Y^* ,$$

where

i = interest rate, i^* = target interest rate, π = inflation rate, π^* = target inflation rate

Y = real GDP, Y^* = potential (target) real GDP, and $[Y - Y^*]/Y^*$ = real GDP gap

Data Source: Federal Reserve: www.federalreserve.gov/releases

Inflation targeting appears to have been successful in 1990s in bringing down the inflation rate in three countries that adopted a Taylor-rule monetary policy.

But, was the decrease in inflation actually due to the inflation-targeting?

And what was happening with regard to other key economic indicators?

See [*] P. Howitt, "What Have Central Bankers Learned…"J of Macro 2012, 11-22, Syllabus Section VI.A

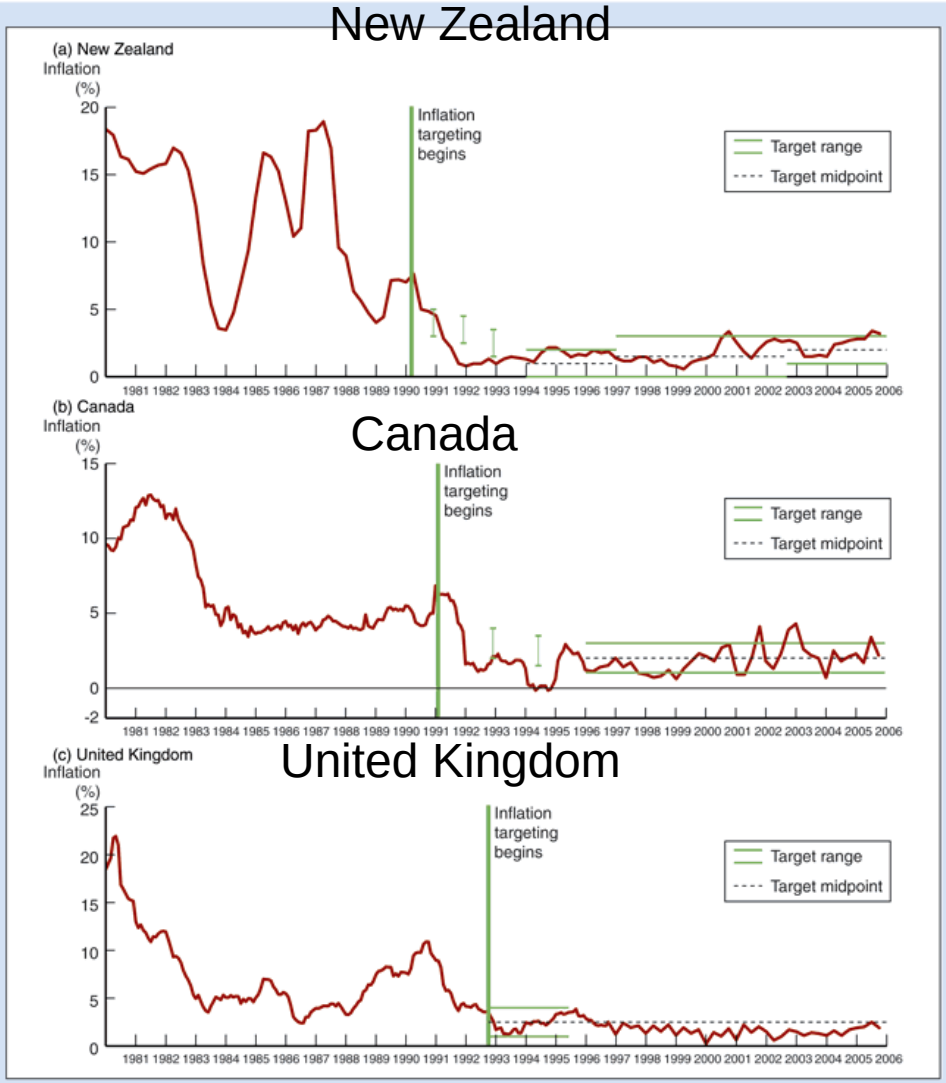


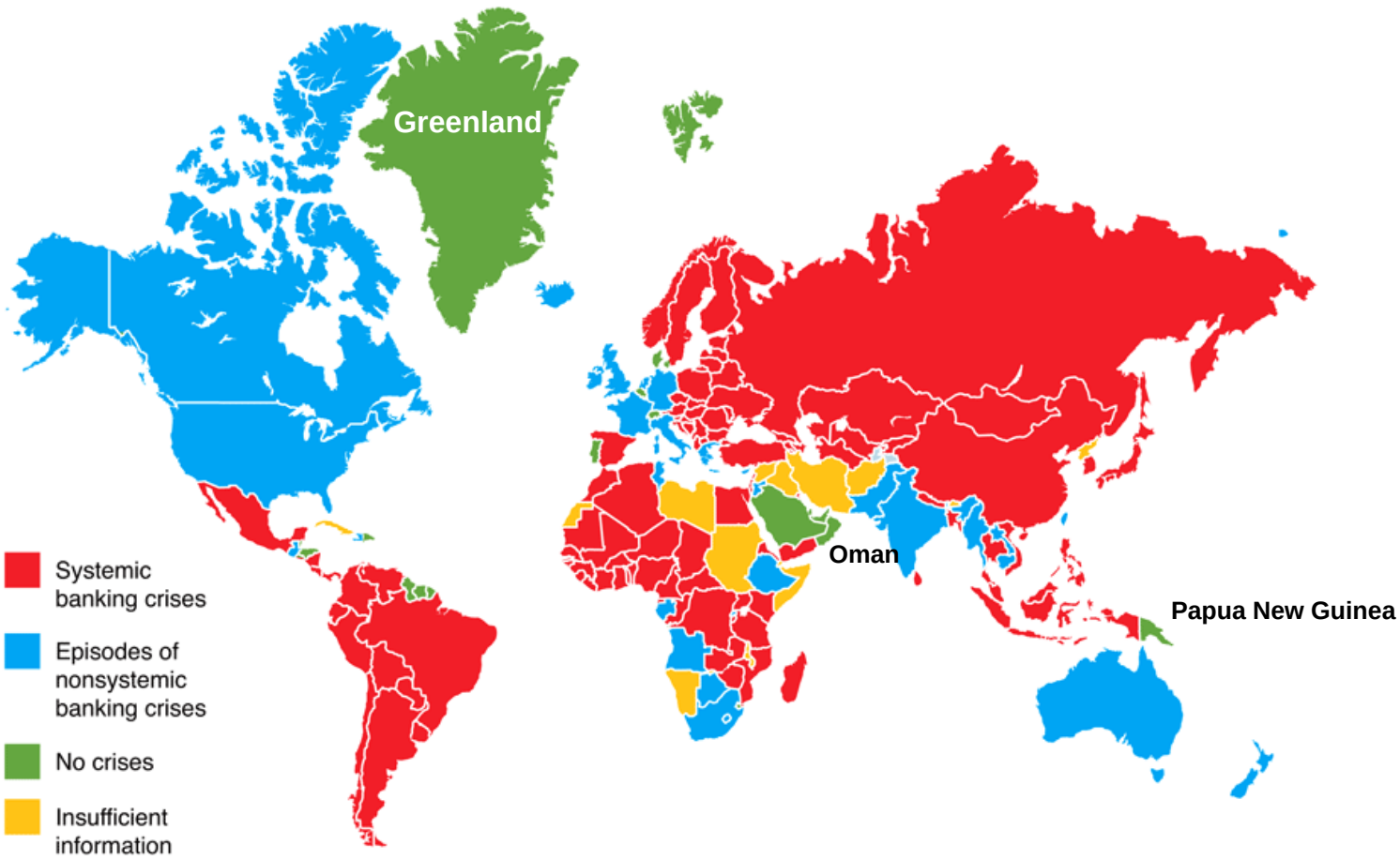
FIGURE 1 **Inflation Rates and Inflation Targets for New Zealand, Canada, and the United Kingdom, 1980–2005**
(a) New Zealand; (b) Canada; (c) United Kingdom

Source: Ben S. Bernanke, Thomas Laubach, Frederic S. Mishkin, and Adam S. Poson, *Inflation Targeting: Lessons from the International Experience* (Princeton: Princeton University Press, 1999), updates from the same sources, and www.rbnz.govt.nz/statistics/econind/a3/ha3.xls.

Financial Crisis (“Bank Crisis”)

- A major disruption in financial markets characterized by
  - A sharp decline in asset prices
  - Failures of many financial & nonfinancial firms

Financial Crises Throughout World Since 1970



Source: Gerard Caprio and Daniela Klingebiel, “Episodes of Systemic and Borderline Financial Crises” mimeo., World Bank, October 1999.

The Cost of Rescuing Banks During Financial Crises in Several Countries

Estimated costs for illustrative financial crises (1980-2003)

Date	Country	Cost as a Percentage of GDP
1980–1982	Argentina	55
1997–2002	Indonesia	55
1990s–ongoing	China	47
1996–2000	Jamaica	44
1981–1983	Chile	42
1997–2002	Thailand	35
1993–1994	Macedonia	32
2000–ongoing	Turkey	31
1977–1983	Israel	30
1997–2002	South Korea	28
1988–1991	Cote d'Ivoire	25
1991–ongoing	Japan	24
1994–1995	Venezuela	22
1998–2001	Ecuador	20
1994–2000	Mexico	19
1997–2001	Malaysia	16
1992–1994	Slovenia	15
1998–ongoing	Philippines	13
1994–1999	Brazil	13
1995–2000	Paraguay	13
1989–1991	Czech Republic	12
1997–1998	Taiwan	12
1991–1994	Finland	11
1989–1990	Jordan	10
1991–1995	Hungary	10
1990–1993	Norway	8
1991–1994	Sweden	4
1988–1991	United States	3

Source: Gerard Caprio, Daniela Klingebiel, Luc Laeven, and Guillermo Noguera, *Banking Crises Database* (updated October 2003), http://www1.worldbank.org/finance/html/database_sfd.html.

Key Puzzle About Many Observed Financial Crises

- How can a country shift so dramatically from a path of reasonable growth **before** a financial crisis to a sharp decline in economic activity **after** a crisis occurs?

- **Possible Explanation:** Role of ***positive feedback (reinforcement)*** in which an initial shock (trigger event) leads to subsequent events that ***amplify*** the original shock.

Example: Deflation reduces borrowing for new spending, which further deflates prices.

Table 10-2 What Happened During the Great Depression?

Year	Unemployment Rate	Real GNP	Real Consumption	Real Investment	Real Government Purchases
1929	3.2	203.6	139.6	40.4	22.0
1930	8.9	183.5	130.4	27.4	24.3
1931	16.3	169.5	126.1	16.8	25.4
1932	24.1	144.2	114.8	4.7	24.2
1933	25.2	141.5	112.8	5.3	23.3
1934	22.0	154.3	118.1	9.4	26.6
1935	20.3	169.5	125.5	18.0	27.0
1936	17.0	193.2	138.4	24.0	31.8
1937	14.3	203.2	143.1	29.9	30.8
1938	19.1	192.9	140.2	17.0	33.9
1939	17.2	209.4	148.2	24.7	35.2
1940	14.6	227.2	155.7	33.0	36.4

Double-Dip Recession

Effects of US President Roosevelt's 1933-1938 "New Deal" legislation

Source: Historical Statistics of the United States, Colonial Times to 1970, Parts I and II, U.S. Department of Commerce, Bureau of Census, 1975, Washington, D.C. The unemployment rate series D9. Real GNP, consumption, investment, and government purchases are series: F3, F48, F52, and F66, and are measured in billions of 1958 dollars. The interest rate is the prime Com-

Year	Nominal Interest Rate	M1 Money Supply	GNP Deflator Price Level	Rate of Inflation	Real Money Balances
1929	5.9	26.6	50.6	—	52.6
1930	3.6	25.8	49.3	−2.6	52.3
1931	2.6	24.1	44.8	−10.1	54.5
1932	2.7	21.1	40.2	−9.3	52.5
1933	1.7	19.9	39.3	−2.2	50.7
1934	1.0	21.9	42.2	7.4	51.8
1935	0.8	25.9	42.6	0.9	60.8
1936	0.8	29.6	42.7	0.2	62.9
1937	0.9	30.9	44.5	4.2	69.5
1938	0.8	30.5	43.9	−1.3	69.5
1939	0.6	34.2	43.2	−1.6	79.1
1940	0.6	39.7	43.9	1.6	90.3

Standard types of macro data shown for Great Depression (e.g., Mankiw text). Do these types of data give a sufficiently complete picture to permit economists to understand the causes of the Great Depression?

What Caused 1929-1939 US Great Depression ?

Three Different Theories Proposed:

- Breakdown in financial system was simply a **response to** (not a cause of) an initial decline in aggregate output. *(not consistent with the empirical evidence)*

- U.S. Great Depression caused by a rapid decline in money supply -- an inappropriate monetary policy. *("Monetarists," e.g., Milton Friedman)*

- General disruption occurred in financial markets that then adversely affected aggregate output and prolonged the depression. *(Frederic Mishkin's view)*

What caused 2007-2009 US "Great Recession?"

Bond Ratings by Moody's, Standard & Poor's, and Fitch

(Mishkin, Table 6-1)

Rating			
Moody's	S&P	Fitch	Definitions
Aaa	AAA	AAA	Prime Maximum Safety
Aa1	AA-	AA-	High Grade High Quality
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Upper Medium Grade
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Lower Medium Grade
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Non Investment Grade
Ba2	BB	BB	Speculative
Ba3	BB-	BB-	
B1	B-	B-	Highly Speculative
B2	B	B	
B3	B-	B-	
Caa1	CCC+	CCC	Substantial Risk
Caa2	CCC	—	In Poor Standing
Caa3	CCC-	—	
Ca	—	—	Extremely Speculative
C	—	—	May be in Default
—	—	DDD	Default
—	—	DD	—
—	D	D	

AAA: Year-1 default probability = 0.061%

BBB: Year-1 default probability = 0.978%

Junk (Below BBB)

CCC: Year-1 default probability = 29.945%

The Making of a Mortgage CDO

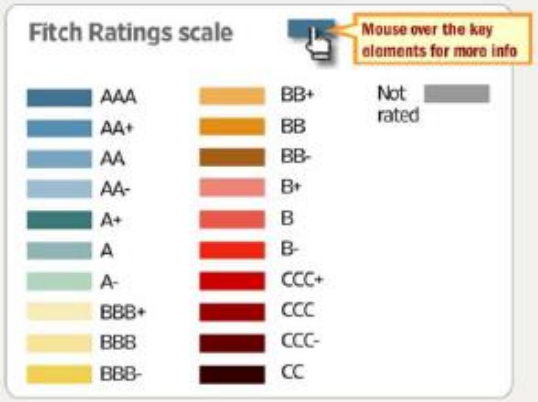
Email Link Print

The technology behind the collateralized debt obligation, or CDO, has been around since the 1980s, but only more recently has it been applied to mortgage-backed securities. It was designed to provide investors with greater diversification and disperse the risk of mortgage lending. But so-called mezzanine CDOs such as Norma actually served to magnify and concentrate the risk. Here is how they were made. *Click on each step button below to learn more.*

Step 1

The creator of a subprime residential mortgage-backed security -- or RMBS -- buys loans from all over the country, often from several different lenders. Several thousand loans go into one mortgage-backed security. Because the security combines the specific risks of all the individual loans into a single pool, its investors as a whole are less exposed to the potential problems of any one borrower.

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6



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http://online.wsj.com/public/resources/documents/info-flash07.html?project=normaSubprime0712&h=530&w=980&hasAd=1&settings=normaSubprime0712

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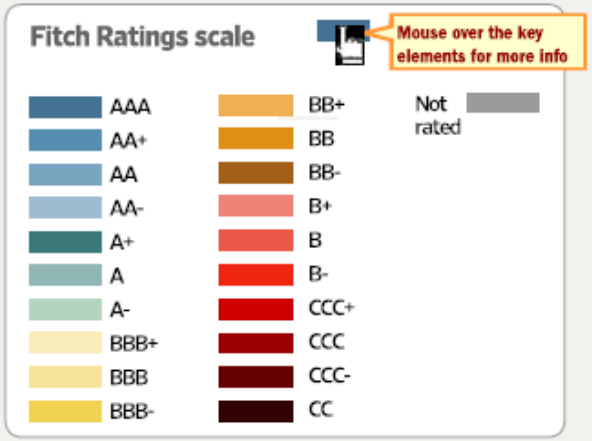
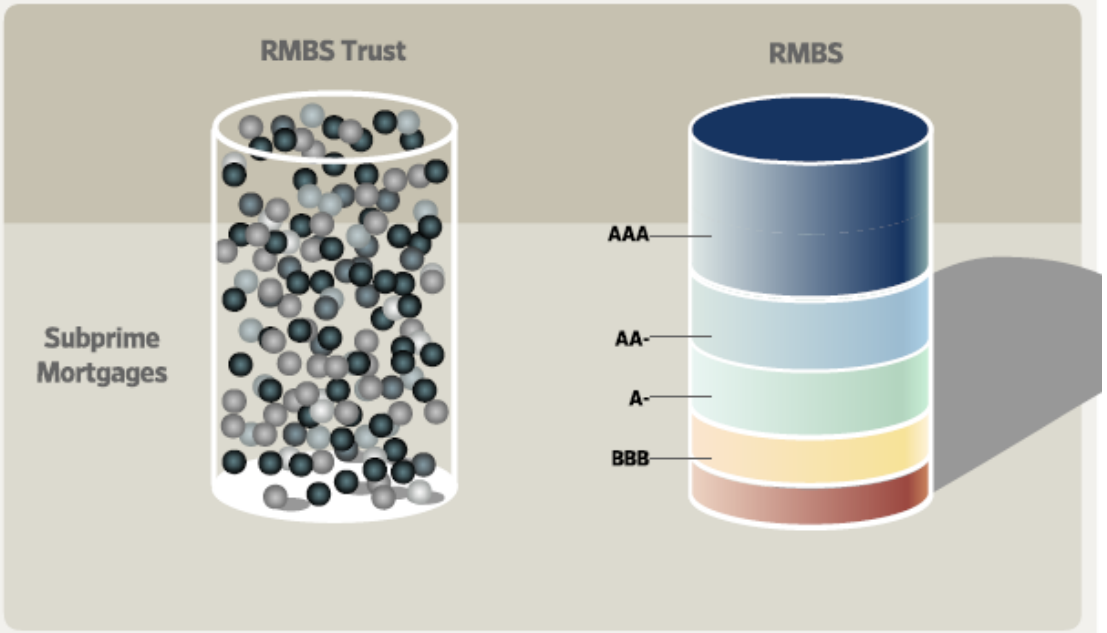
Step 2

The residential mortgage-backed security repackages and redistributes the income from the loans among different classes of bonds. Highly rated bonds are the first to receive income and the last to suffer any losses, but they also offer the lowest return. Low-rated bonds pay a better return, but are also among the first to take any losses if borrowers renege on the loans in the pool.

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6





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Step 3

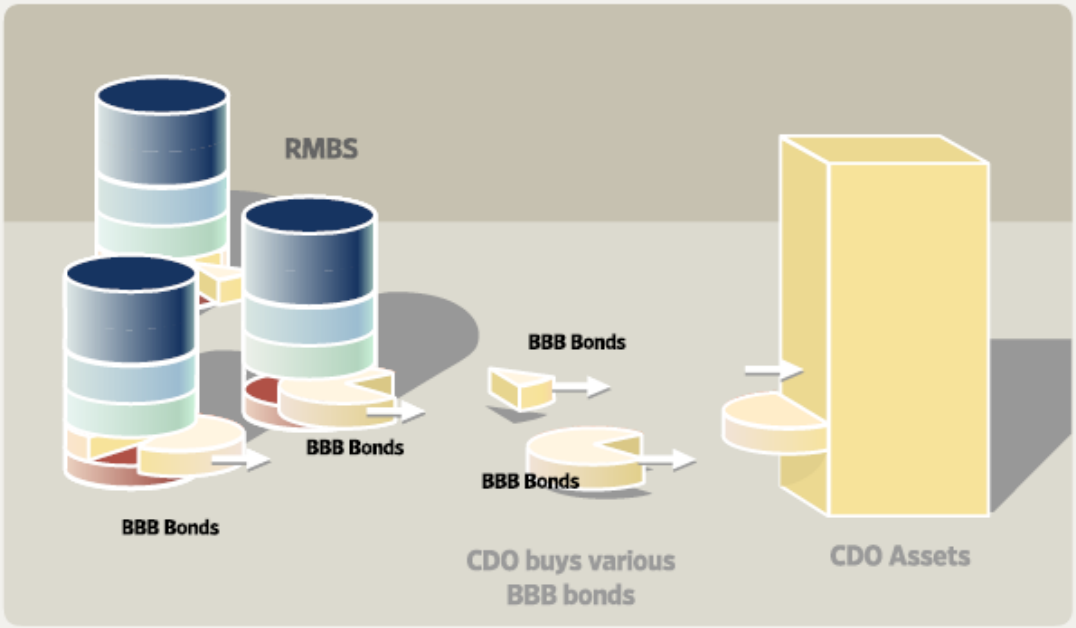
As many as 150 mortgage-backed bonds -- or other mortgage-linked investments -- are packaged into a single CDO. In the case of a mezzanine CDO, those investments are mostly linked to pieces of mortgage-backed securities that carry a rating of triple-B, just above junk. This boosts the yield the CDO can offer, but also makes its investors more vulnerable to losses.

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6

Fitch Ratings scale

Mouse over the key elements for more info

AAA	BB+	Not rated
AA+	BB	
AA	BB-	
AA-	B+	
A+	B	
A	B-	
A-	CCC+	
BBB+	CCC	
BBB	CCC-	
BBB-	CC	



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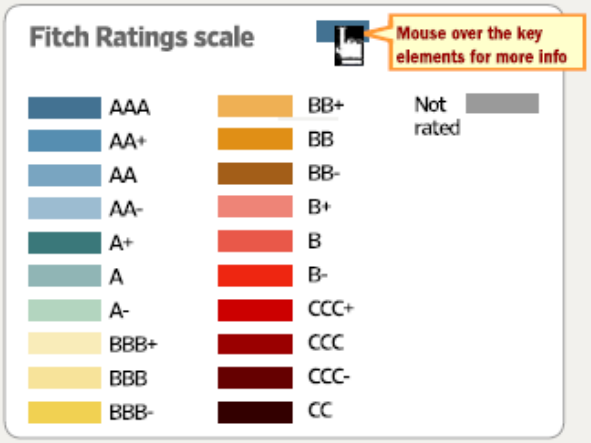
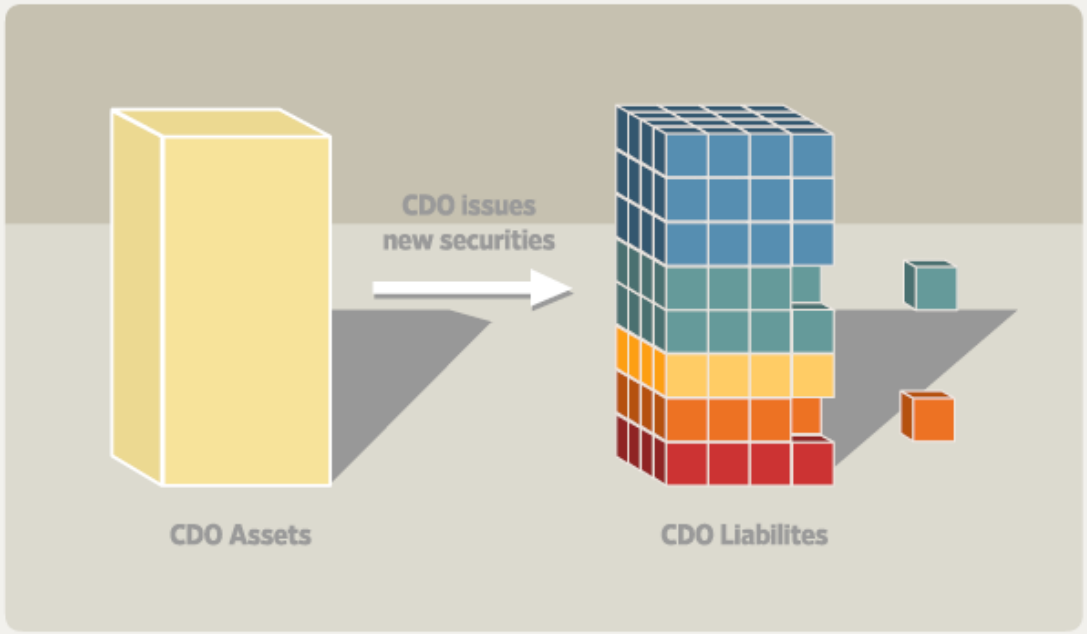
Step 4

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6

Much like an RMBS, the CDO issues new bonds, each with its own level of risk and return. The pieces of the CDO with middling ratings like A or triple-B are often sold off to other CDOs.





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Step 5

Investors in the lower-rated pieces of a CDO are the last to get paid and the first to take losses. This protects investors in the higher-rated pieces, as long as all the CDO's investments don't go bad together. The similarity of the triple-B-rated investments in a mezzanine CDO, though, increases the likelihood that they will all suffer at once.

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6

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Mouse over the key elements for more info

AAA	BB+	Not rated
AA+	BB	
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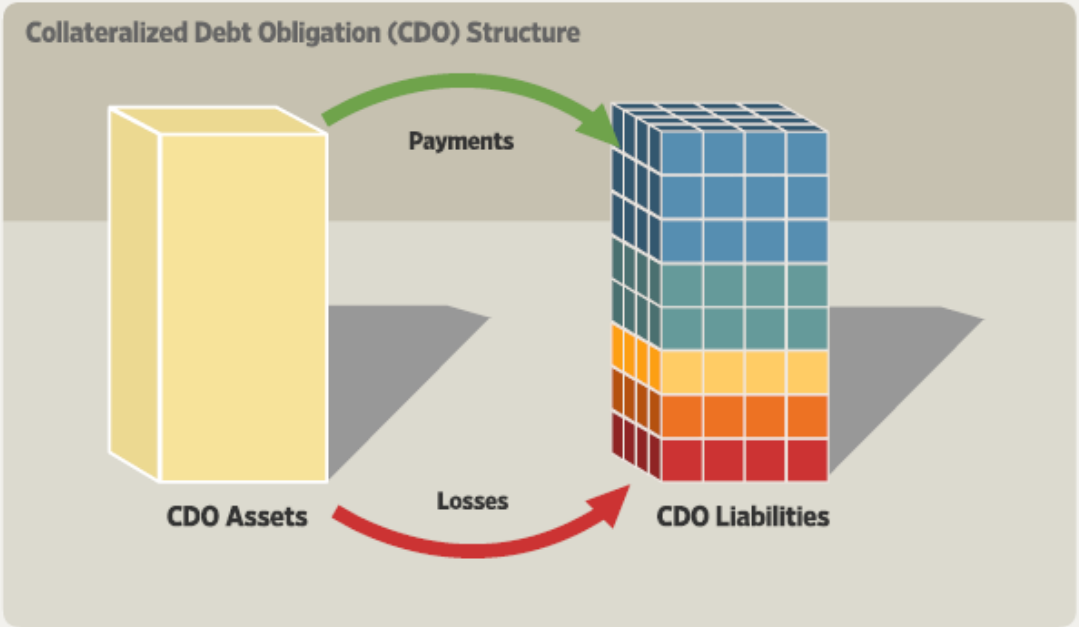
A+	B	
A	B-	
A-	CCC+	
BBB+	CCC	
BBB	CCC-	
BBB-	CC	



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Step 6

Credit-rating firms initially gave their highest triple-A ratings to three-quarters of the securities Norma issued. But as house prices plummeted and defaults rose across the country, investors and analysts expectations of losses rose well into the range that would hit the triple-B investments that Norma contained. As a result, the value of investments in Norma plummeted, and rating companies downgraded bonds issued by Norma to junk.

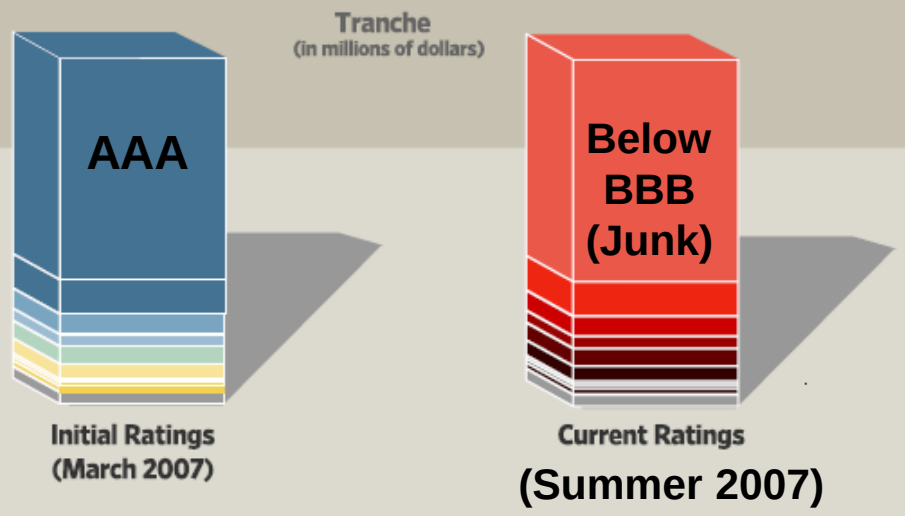
Step 1 Step 2 Step 3 Step 4 Step 5 Step 6

Fitch Ratings scale

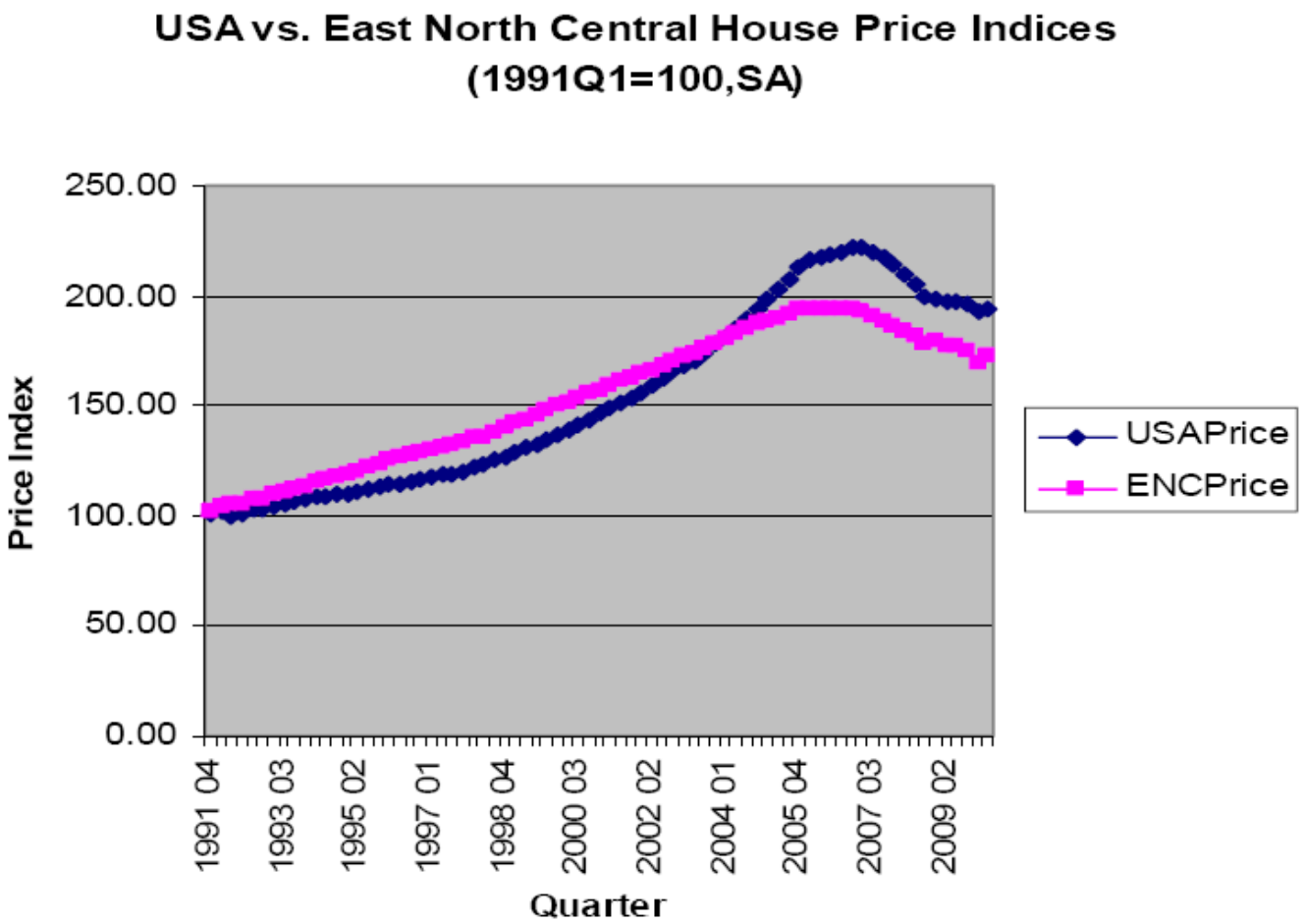
Mouse over the key elements for more info

AAA	BB+	Not rated
AA+	BB	
AA	BB-	
AA-	B+	
A+	B	
A	B-	
A-	CCC+	
BBB+	CCC	
BBB	CCC-	
BBB-	CC	

NORMA Collateralized Debt Obligation (CDO) Structure

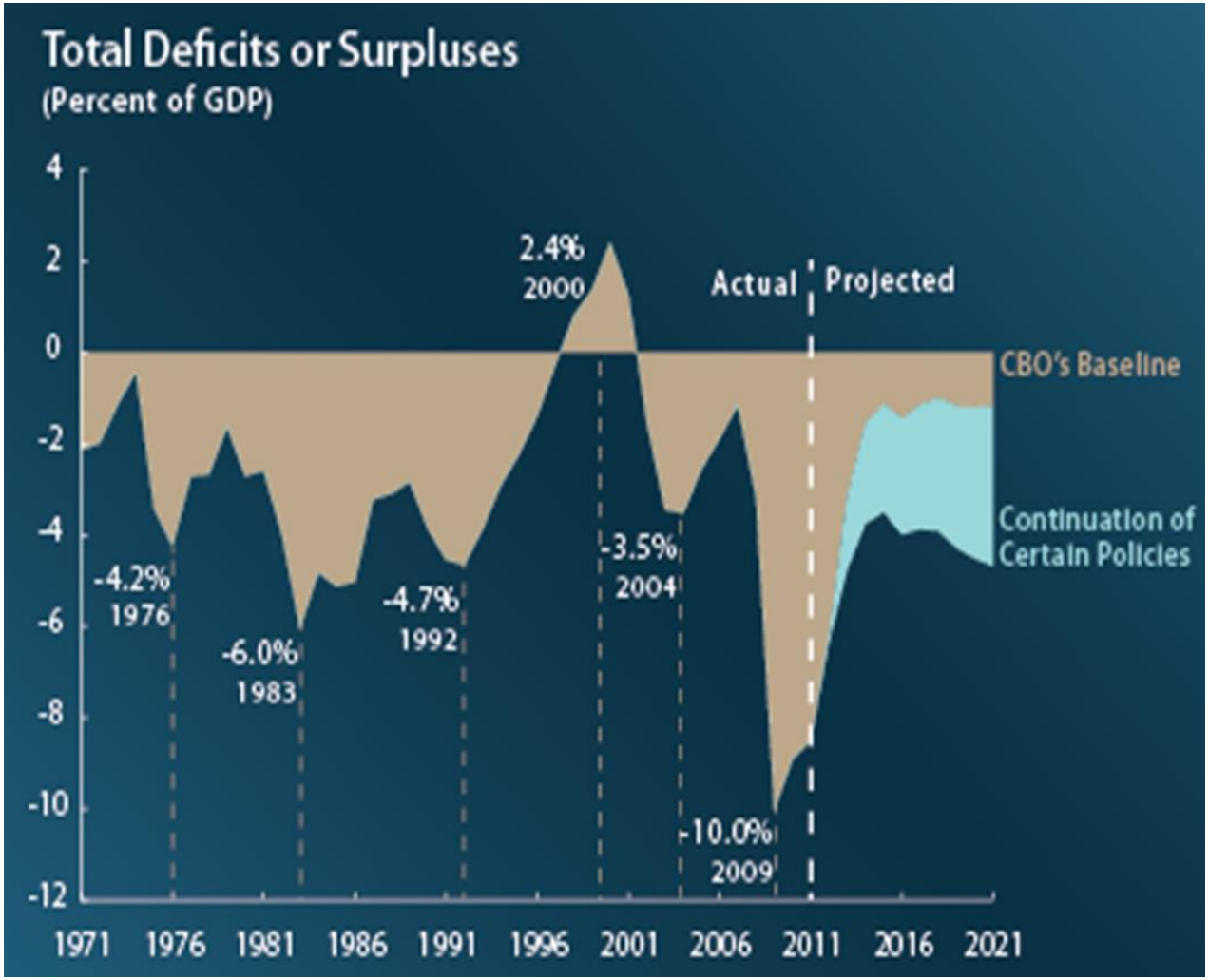


US Housing Price Bubble Burst in 2006



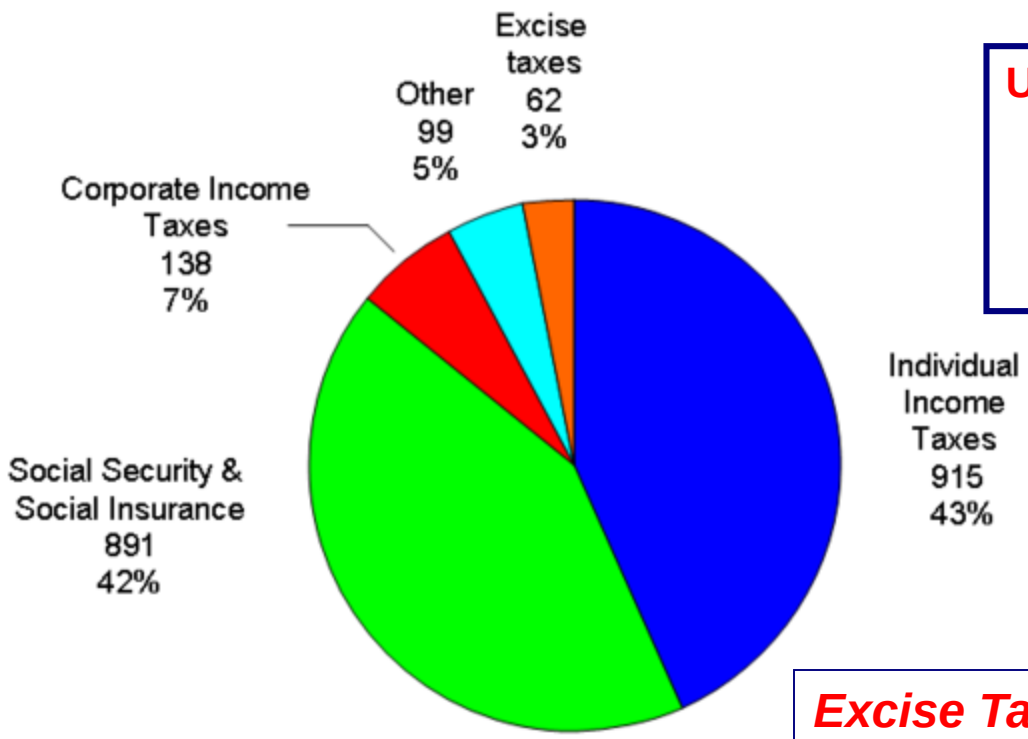
Federal Government Budget Deficits (G-tY > 0): Cause or Consequence of Economic Crises?

2016 Estimate:
Deficit ≈
3.2% of GDP



USA Government Budget Deficits and Surpluses as a Percentage of GDP
Source: Congressional Budget Office (http://www.cbo.gov/)

U.S. Federal Receipts – Fiscal Year 2009 ($ Billions)



Total
$2,105 B

Updates 2015: $3.25 Trillion

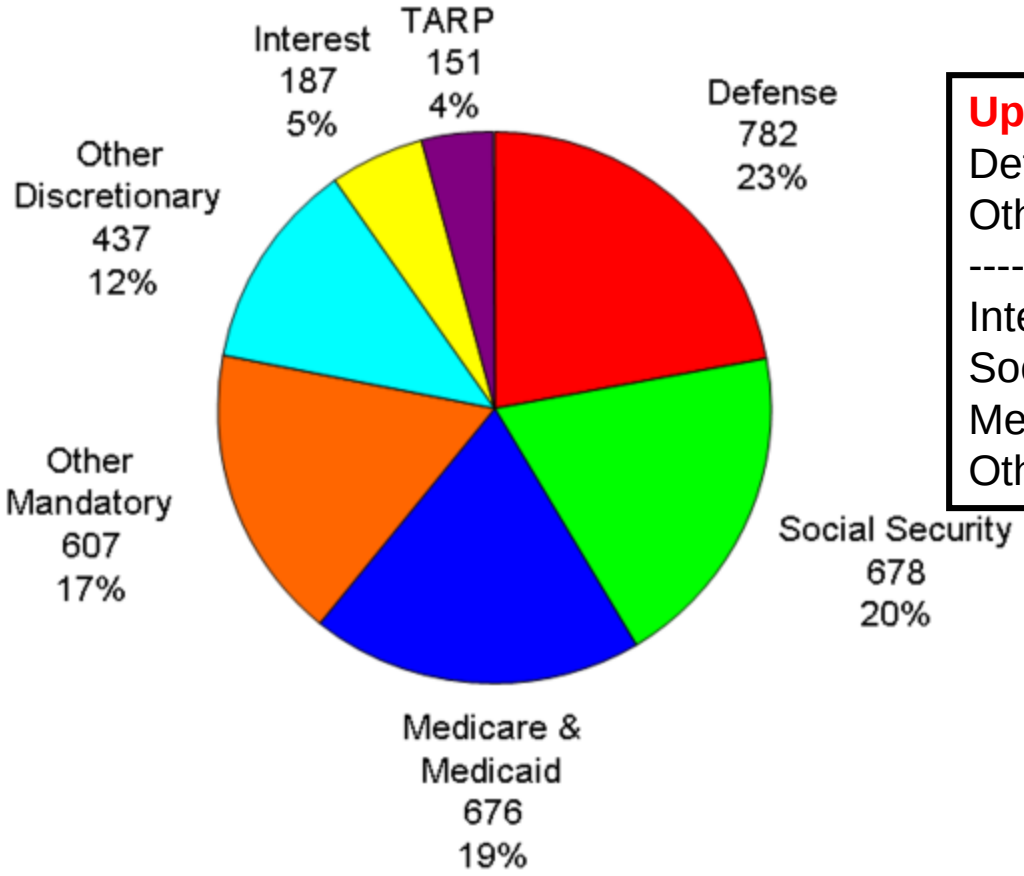
Individual Income Taxes 47%
Payroll Taxes (SS/SI) 33%
Corporate Income Taxes 11%
Other 9%

Source Data: OMB – 2011 Budget – Summary Table S-3

Excise Tax: A fixed amount of tax charged per item bought, e.g., $1

Sales Tax: A tax on a purchased good calculated as a percentage of the good's purchase price.
e.g., [1.05] x price = after-tax price

U.S. Federal Spending – Fiscal Year 2009 ($ Billion)



Total
$3,518 B **($3.5 trillion)**

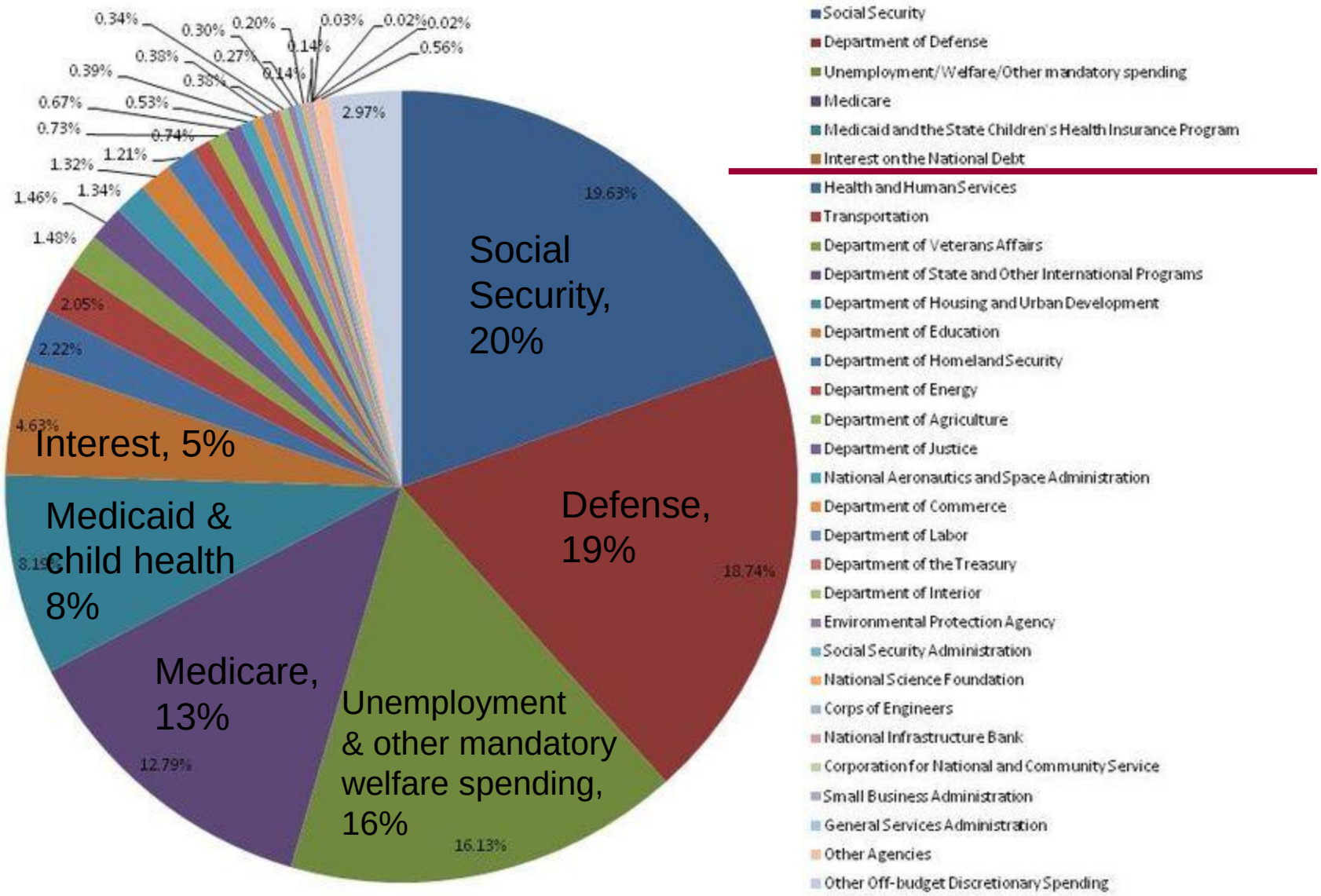
Updates 2015: $3.7 Trillion
Defense 16%
Other Discretionary 16%

Interest 6%
Soc Sec 24%
Medicare/Medicaid 25%
Other Mandatory 13%

Source: OMB - 2011 Budget - Summary Table S-3

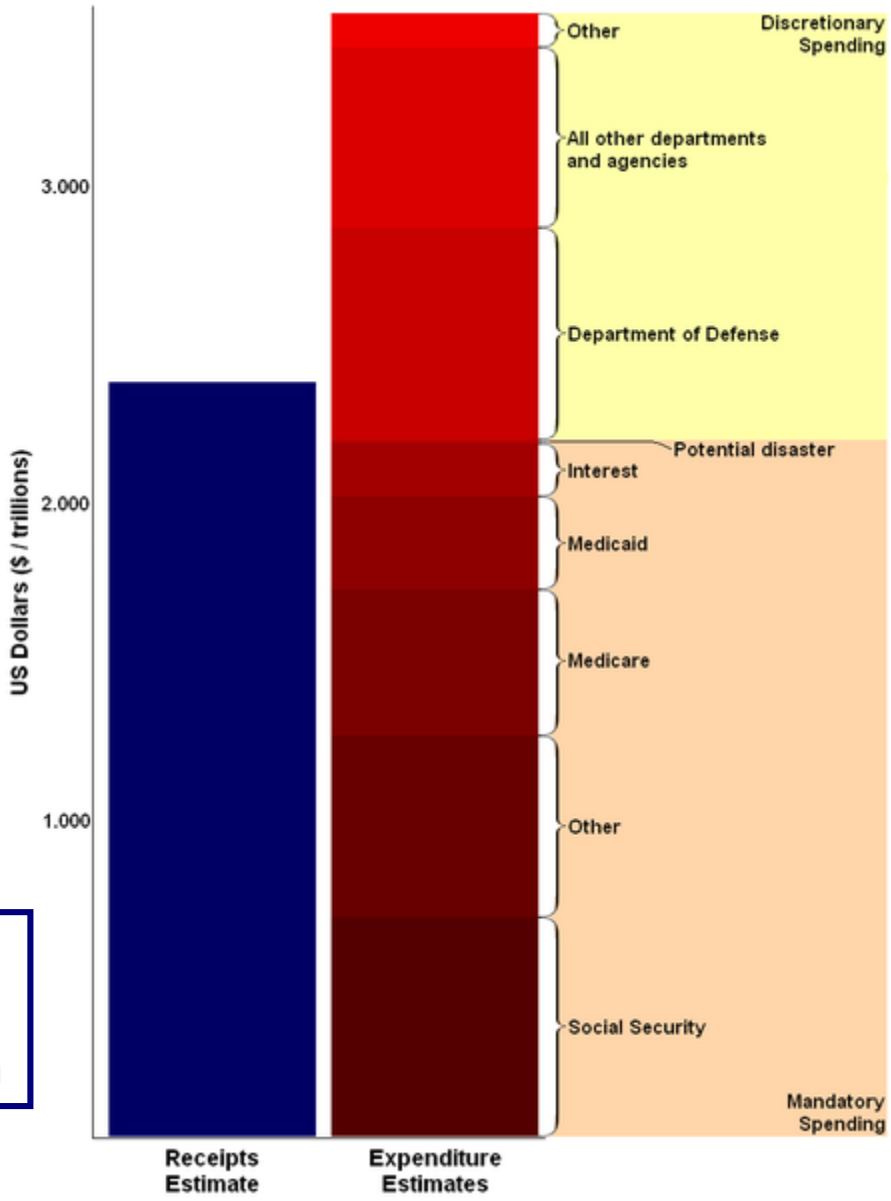
TARP = ***T***roubled ***A***sset ***R***elief ***P***rogram

U.S. Federal Budget By Category %: Fiscal Year 2010



Source: Kelvin Case, en.wikipedia, 8/1/2010

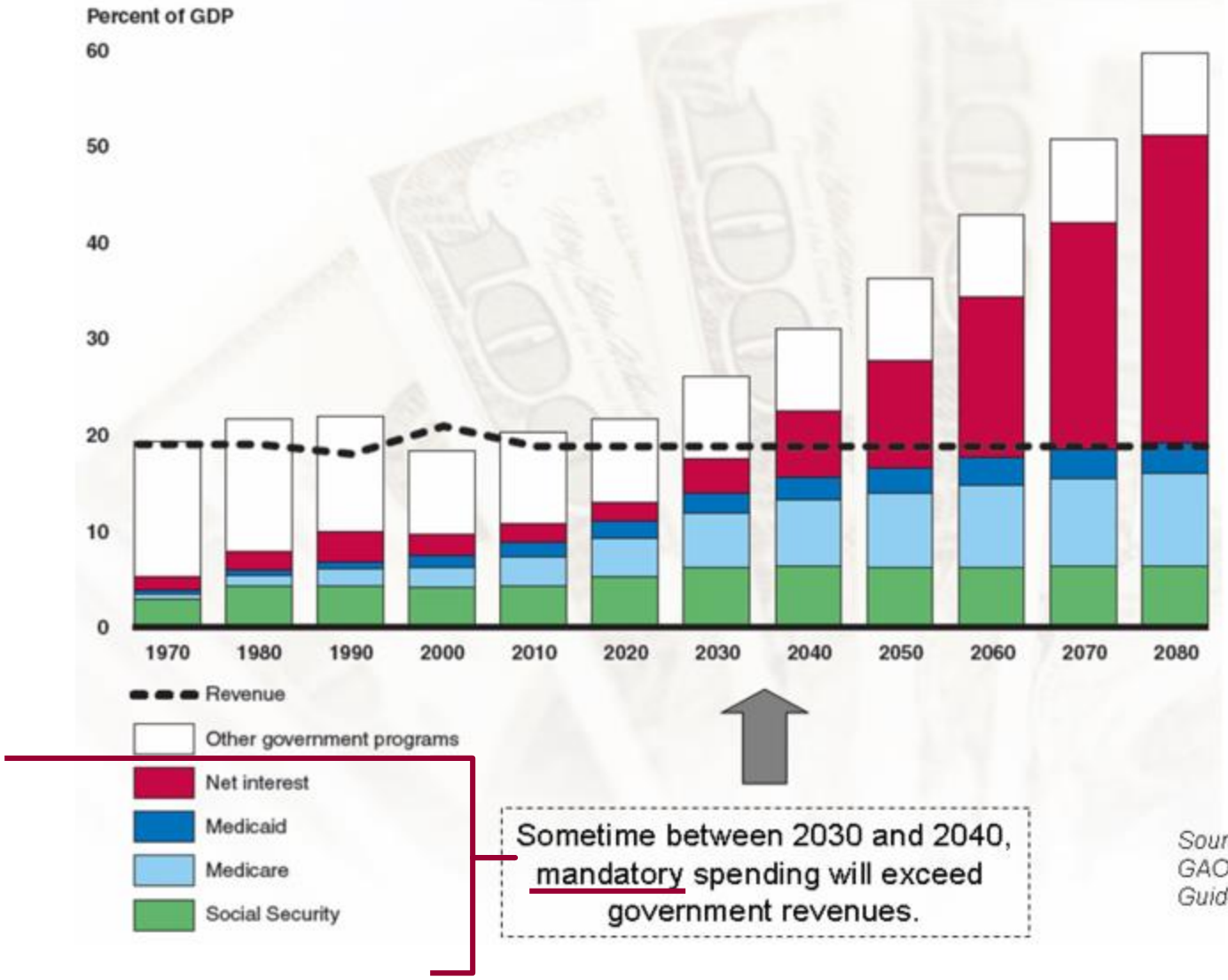
US Federal Government receipts and expenditures for 2010



Update 2015:
Receipts ≈ $3.25 trillion
Mandatory spending ≈ $2.5 trillion

Source: Kelvin Case, en.wikipedia

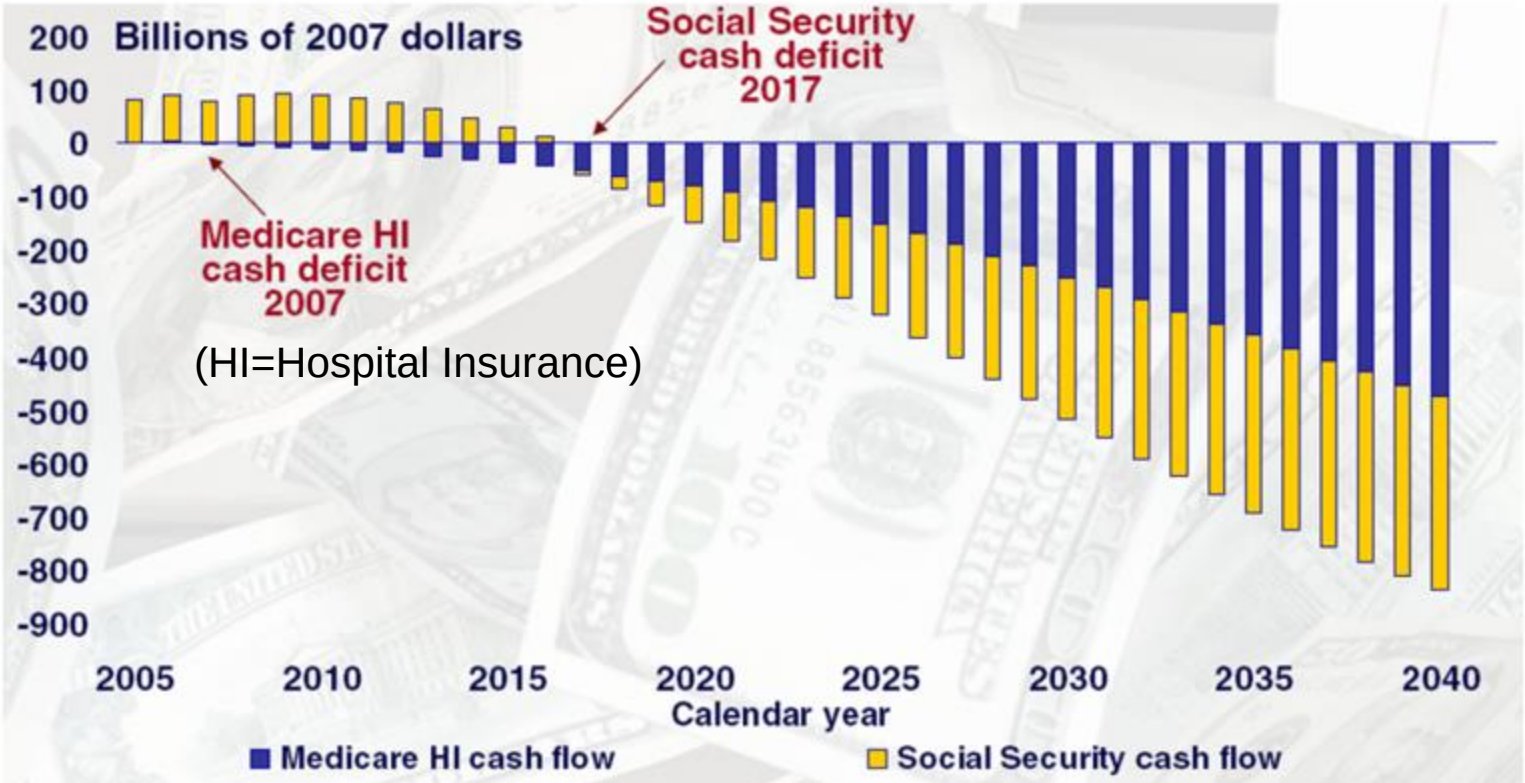
The Risks of Growing Entitlement Spending



Sometime between 2030 and 2040, mandatory spending will exceed government revenues.

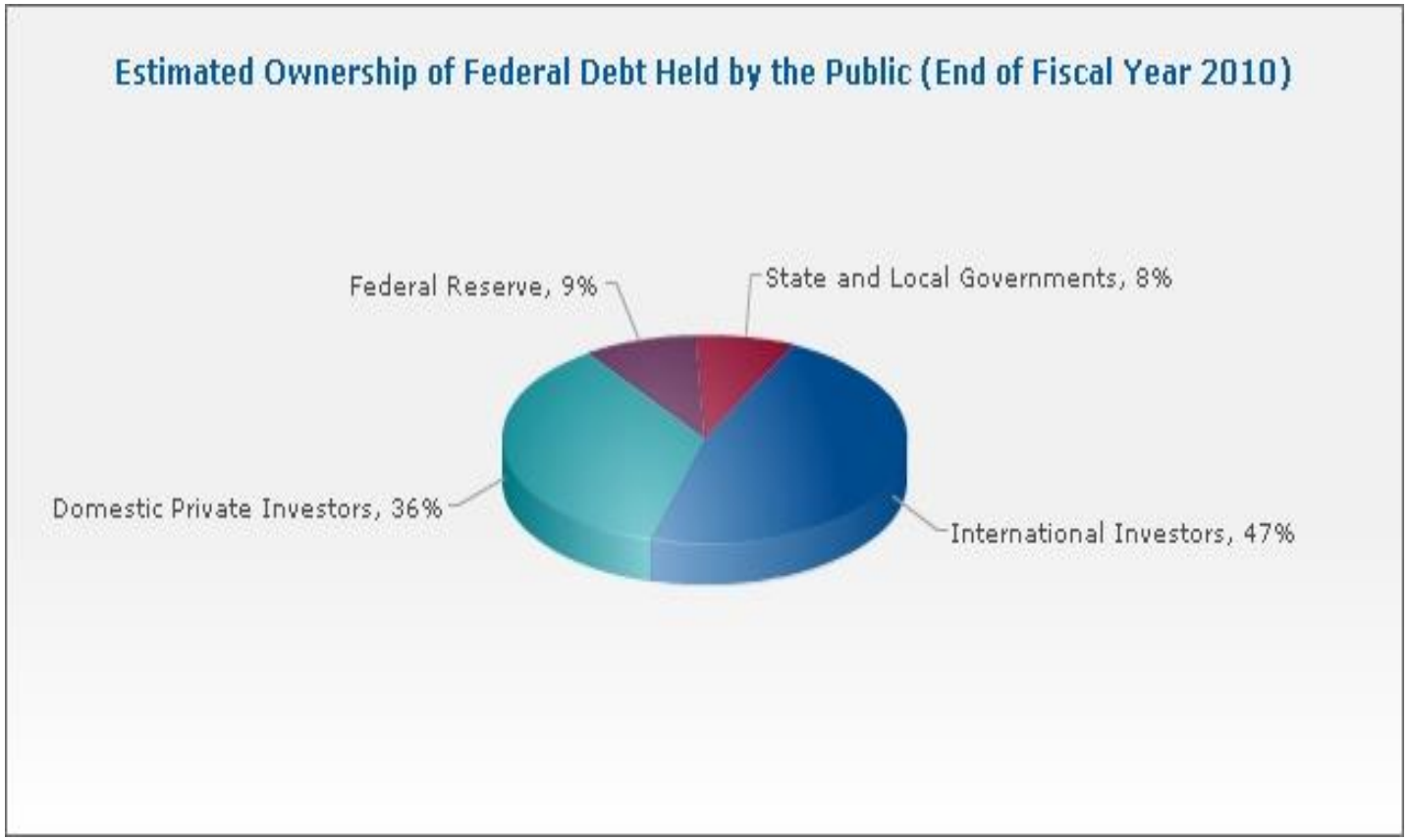
Source: GAO Citizen's Guide 2007

Medicare and Social Security Face Large Deficits



Source: GAO analysis of data from the Office of the Chief Actuary, Social Security Administration and Office of the Actuary, Centers for Medicare and Medicaid Services.

Note: Projections based on the intermediate assumptions of the 2007 Trustees' Reports. The CPI is used to adjust from current to constant dollars.



Debt = Accumulated value over time of deficits net of surpluses

Gross Fed Debt = Value of all debt instruments issued by the US Treasury;

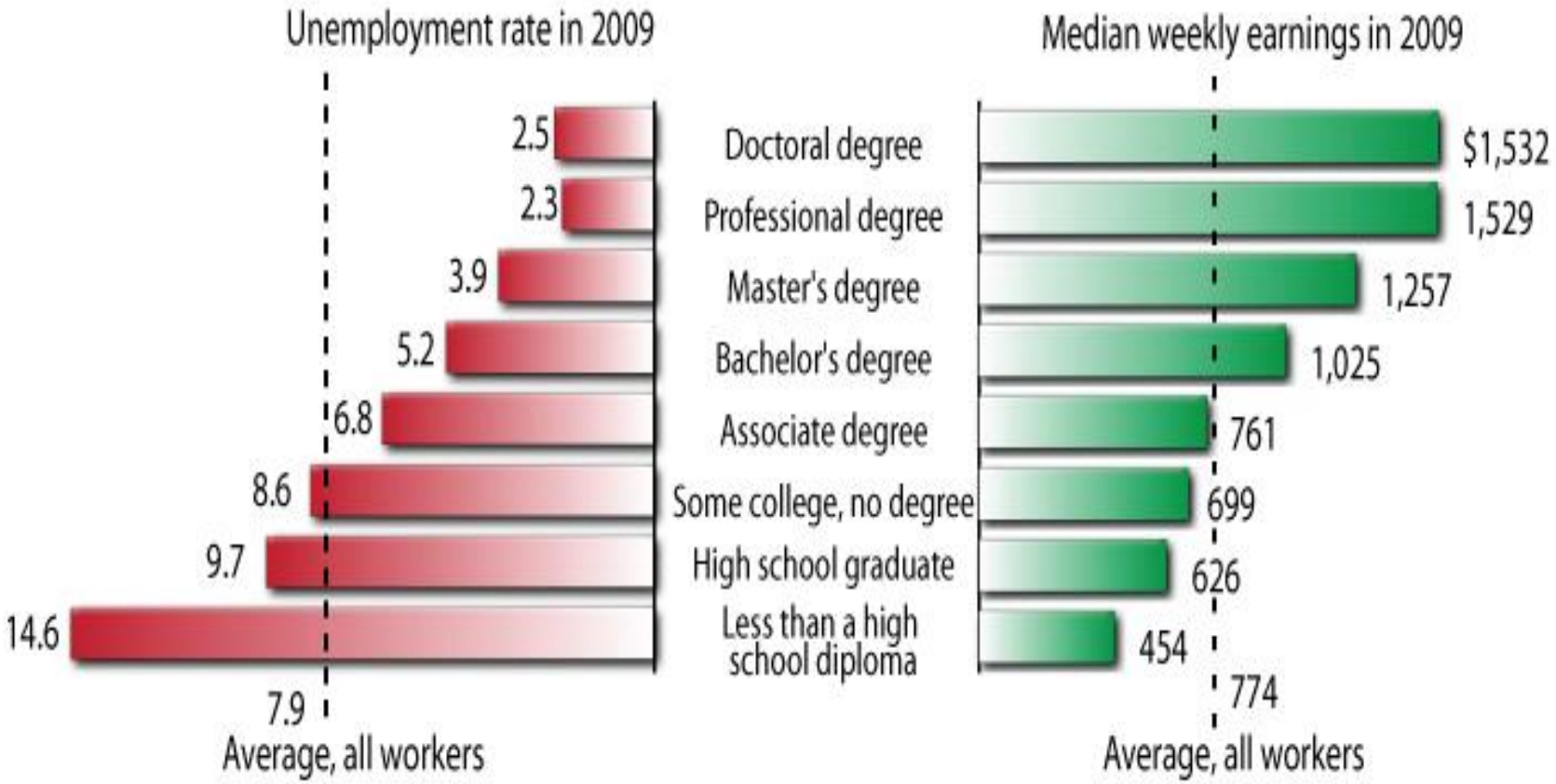
Fed Debt Held by the Public

= (Gross Fed Debt) – (Fed Debt held by Fed government itself)

= Fed debt held (owned) by international investors, US private investors, US Fed Reserve Banks, & US state and local gov'ts

Source: Federal Reserve, Flow of Funds Accounts of the US, Third Quarter, 2010

Education pays



Source: Bureau of Labor Statistics, Current Population Survey